FRD ACTIVITIES REPORT
September 2007

News Flash

The FRD Activities Report has been produced on a monthly basis for almost 9 years. Records indicate this report has been a fixture at FRD since at least January 1999. With the arrival of the new Air Resources Laboratory director, the requirement to produce a monthly report has been discontinued. Instead, the division will make an informal weekly progress report to the ARL Director that will be followed every three months with a formal quarterly report. We will not make the weekly informal reports public, but our readers can still look forward to formal quarterly activity reports, albeit on a less frequent basis. This issue marks the end of the monthly activities report. Our first quarterly report will be produced in January 2008, and will cover the time period from October through December 2007.

Research Programs

Urban Dispersion Program

The manuscript "Atmospheric Flow Decoupling and its Effects on Urban Plume Dispersion" is still under review at the journal Boundary Layer Meteorology. The manuscript "Plume Dispersion Anomalies in a Nocturnal Urban Boundary Layer in Complex Terrain" is still under review at the Journal of Applied Meteorology and Climatology. The draft manuscript "Probability Density Functions and Peak-to-Mean Ratios for Tracer Plumes in an Urban Boundary Layer" passed ARL review and is awaiting approval by outside co-authors before final editing and journal submission. (Dennis Finn, 208-526-0566)

Perfluorocarbon Tracer Analysis Development

Steps taken during the month of September appear to have culminated in a successful resolution of the recent problems experienced with the PFT method. These included rapid baseline drift, rapid changes in response, low sensitivity, and peak interferences. The final resolution required replacing the ECD detector, the installation of additional pressure regulators and flow controllers, and adjustments to the settings for flows, voltage, and peak integration parameters. Tests have shown that the voltage baseline and response are now much more stable and some peak interferences were eliminated. Furthermore, it was found that the response and baseline are stabilizing much more quickly, and at lower voltages, than when the modified configuration was first tested. This breakthrough has enabled us to complete the sample aging tests. These tests concluded that sample concentrations in the bags (250, 4000, and 100,000 pptv) remained stable for at least 7-8 months, within the uncertainty in the measurement. We also continued

development of software that will allow overlapping peaks to be automatically separated which may improve the handling of interferences in the future. Preparations have begun for final testing to ensure that all sampling and analytical artifacts have been identified and all necessary quality control protocols have been established. (Dennis Finn, 208-526-0566, and Roger Carter)

Cooperative Research with DOE NE-ID (Idaho National Laboratory)

Emergency Operations Center (EOC)

An EOC quarterly assessment meeting was held at the alternate EOC location in September. This meeting was attended by the BEA Assessment Specialists and a representative from FRD. A tabletop exercise was conducted in which we talked through an INL site emergency scenario. The drill was designed to make sure equipment was working in the alternate EOC and to have better communication between the parties in case of a real emergency. (Dennis Finn, 208-526-0566)

INL Climatology

The 3rd Edition of the INL Climatology is in preparation. The chapter on the Meteorological Data Sources was completed. The report will include the NOAA INL Mesonet data through December 2006. This new climatology report will be useful to planners and operations staff that support the INL and to the general public. The manuscript should be ready for ARL review in the next couple of weeks. (Jason Rich, 208-526-9513, and Neil Hukari).

Radar Wind Profiler

To improve confidence in INL wind measurements, we are beginning a comparison of the INL boundary layer wind profiler measurements with wind measurements from the NOAA INL Mesonet. This requires finding examples where the meteorological conditions would be expected to make the tower measurements comparable to some of the profiler measurements. We are also looking for other ways to make wind measurements that would be more directly comparable to profiler measurements. We hope to have some results in the next few months. (Roger Carter, 208-526-2745)

Transport and Dispersion Modeling

Several tests of the WRF-Var data assimilation system have been conducted at FRD using the NOAA MADIS database as the source of field observations. In these tests, 12 hour WRF forecasts for Southeast Idaho were first generated in the normal manner using output from the NCEP RUC model to initialize WRF. The model was then run a second time after using WRF-Var to assimilate all available data from MADIS (including surface observations, rawinsonde soundings, and aircraft observations) into the model initial conditions. Rather surprisingly, the WRF forecasts that included data assimilation often appeared to have less skill than those that used only the RUC output. Further investigation suggested that the cause of this behavior may be the rather poor representation of stable boundary layers in numerical models. Typically, these

models exhibit a warm bias associated with the morning minimum temperatures because of problems in the boundary-layer parameterization. Most of the assimilation tests were conducted on 1200 UTC (0600 local time) runs of the WRF model, when the boundary layer is stable. By forcing the surface temperatures closer to the observations, the data assimilation appears to retard the development of the daytime boundary layer, causing unexpected forecast errors later in the day. (Richard Eckman, 526-2740)

Coordination with BEA Emergency Management Group

A meeting to inform the BEA Emergency Management Group of upgrades and improvements instituted at FRD this calendar was held at the Willow Creek Building on 19 September. We discussed and demonstrated the forecasting and data dissemination improvements made through NIWC, the NOAA INL Weather Center web page (http://niwc.noaa.inel.gov/). The most notable improvements include weather notices and advisories that are now issued from our office, and access to the newly acquired real-time lightning data on and around the site. Other site specific weather forecasts and reports are available through this one stop clearing house for the INL. We also discussed the progress made to-date on transitioning our dispersion model from MDIFF to HySPLIT. We agreed to develop a transition plan and milestones and to incorporate improvements and suggestions made by BEA. We also agreed to jointly formulate criteria for weather notices and advisories made by our office on the NIWC web page. (Kirk Clawson, 208-526-2742)

Other Activities

Outreach

Donna Harris participated in the "Jail and Bail" program sponsored by the March of Dimes and raised approximately $200 in donations.

Papers

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, C. Biltoft, K.J. Allwine, J.E. Flaherty, and M.J. Leach, 2007: Atmospheric Flow Decoupling and Its Effects on Urban Plume Dispersion. Extended Abstract, Seventh Symposium on the Urban Environment. San Diego 9-13 September.

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, C. Biltoft, K.J. Allwine, J.E. Flaherty, and M.J. Leach, 2007: Analysis of Plume Dispersion, Decay, and Peak-to-Mean Excursions for Continuous Tracer Gas Releases in an Urban Core, Oklahoma City, JU2003. (In review at Boundary Layer Meteorology)

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, K.J. Allwine, and J.E. Flaherty, 2007: Analysis of Plume Dispersion in a Nocturnal Urban Boundary Layer in Complex Terrain, Salt Lake City, URBAN 2000. (In review at Journal of Applied Meteorology and Climatology)

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, C. Biltoft, K.J. Allwine, J.E. Flaherty, and M.J. Leach, 2007: Probability Density Functions and Peak-to-Mean Ratios for Tracer Plumes in an Urban Boundary Layer. (Returned from ARL Review)

Safety

Brad Snedden, Disease and Injury Prevention Coordinator for the Division of Occupational Medicine at INL and David Fry, INL Union Safety and Health Representative presented the "Your Personal Blueprint" program, an exercise and injury prevention program. The program can be implemented at work and provides workouts in 10-minute segments.

Travel

Kirk Clawson traveled to the US Army's Dugway Proving Ground, UT, September 17-18, 2007 to attend the VIP tour of the Sensor Data Fusion Project.

Kirk Clawson and Dennis Finn attended the American Meteorological Society 6th Symposium on the Urban Environment in San Diego, CA, on September 9-13, 2007.